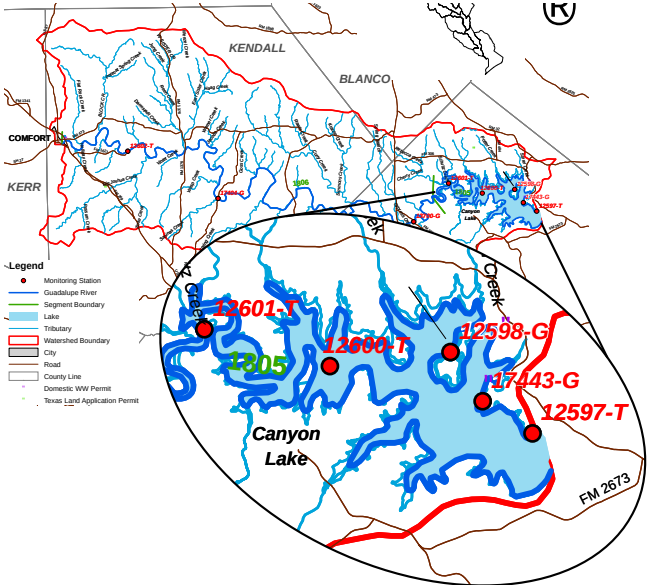

Canyon Reservoir, also known as Canyon Lake, segment 1805, is located in Comal County, west of the city of New Braunfels. The multipurpose reservoir, built by the US Army Corp of Engineers (COE) and the Guadalupe-Blanco River Authority (GBRA) and impounded in the mid-1960's, is designed to serve flood control and water supply functions. It is also used for recreation. Canyon Lake has 8,230 surface acres and over 80 miles of shoreline, seven public parks, two military recreational areas and two marinas. The lake is divided up into four assessment units: the cove around Jacob's Creek Park; the north end of Crane's Mill Park to the south end of Canyon Park; the upper end of the segment; and, the lower end of the reservoir near the dam. The lake has designated uses of contact recreation, exceptional aquatic life use, domestic water supply and aquifer protection.

The reservoir is monomictic, stratifying in the summer and having one turnover per year, usually with the first strong cold front in the fall. The reservoir can be divided into three zones, moving down the reservoir, toward the dam. Those zones include the *riverine zone*, the *transitional zone* and the *lacustrine zone*. The *riverine zone* does not routinely stratify because it is flow-dominated, keeping the waters in this zone mixed. The conditions are often turbid because it is in this zone that sediments carried by stormwater from upstream enter the reservoir. The t*ransitional zone* is the zone where the river reacts with the reservoir. As the flow from the river slows and spreads, the sediment carried by the stream begins to drop out and settles to the bottom. Studies done on the Canyon Reservoir have found that in years of high runoff and sediment loading, the reservoir's anoxic zone can develop in this transitional zone where the decay of the organic deposition depletes the oxygen. The *lacustrine zone* is located near the dam. The lacustrine zone is clear and deep. It is in this area that thermal stratification occurs, as well as, the development of an anoxic layer. In years of low incoming flow the lake will strongly stratify with "layers" called the *epilimnion* at the surface and the *hypolimnion* at the bottom, separated by a *thermocline* (area of rapid thermal change). In years with heavy spring rains and incoming flows, the lake will be more weakly stratified because of volume coming into the reservoir, coupled with the release of water from the bottom, used to evacuate the flood pool. In times where the reservoir is strongly stratified the thermocline is strong enough to keep the waters of the epilimnion and hypolimnion from mixing, creating distinctly different density and oxygen differences through the water column.

The reservoir operates as two parts. The lower portion from elevation 800 to 909 mean sea level (msl) is operated by GBRA for conservation storage. GBRA was granted water rights for 90,000 acre-feet of water per year to be made available for customers through water purchase contracts. GBRA releases water from the conservation pool as it is called for by downstream customers.

The upper portion of Canyon Reservoir is referred to as the "flood pool" and is controlled by the COE. This part of the reservoir captures floodwaters that are usually released at rates sufficient to empty the flood pool without contributing to downstream flooding.

Land Use

The land use in the watershed is made up of residential and business development, resorts, parks and recreational facilities, and ranches with unimproved brush, used for cattle and hunting. The area has been experiencing a high level of growth, with over 8,690 lots platted in Comal County, and a good number of those in the Canyon Lake watershed. The watershed contains a relatively small amount of urbanized area. The town of Sattler and the city of Bulverde are in the watershed, both of which are not currently served by a domestic wastewater treatment facility. There is one small package plant that serves a strip center in Bulverde but that facility only serves the businesses in the center.

The COE has one development regulation that affects the area immediately around the reservoir. There can be no on-site septic systems or major buildings with plumbing or electricity built within the 948 mean sea level elevation. Any another construction must be reviewed and approved by the COE.

There are two wastewater treatment plants that discharge directly to the reservoir. The Canyon Park Estates Wastewater Treatment Facility (CPE) is operated by GBRA and is being expanded to treat 260,000 gallons per day. The facility must treat the domestic wastewater to high quality standards of 5 milligrams per liter (mg/L) of biochemical oxygen demand, 5 mg/L total suspended solids, 2 mg/L ammonia nitrogen and 1 mg/L total phosphorus. The facility discharges to a cove on the north side of the lake. The other wastewater treatment plant that discharges to the lake is operated by the US Department of Army and serves a small recreational facility available to military personnel. The plant is permitted to discharge 12,500 gallons per day. The remaining area around the reservoir is served by septic tanks, with Comal County being the designated representative for enforcement of septic tank rules.

All four assessment units were listed on the 2008 Draft Water Quality Inventory as impaired due to mercury in fish tissue. The listing came as a result of a fish

consumption advisory issued by the Texas Department of State Health Services (DSHS) in 2006. In 2003, a tier one fish tissue survey was conducted by TCEQ, DSHS and Texas Parks and Wildlife Department. A follow-up tier two survey was conducted in 2005. In the follow-up survey 30 fish were collected and analyzed for heavy metals. The species of fish collected in the survey included striped bass, long-nosed gar, largemouth bass, blue catfish, flathead catfish and white bass. In 2005 the action level for mercury in fish tissue was 0.7 mg/Kg. The two species identified in the advisory were striped bass and long-nosed gar. These two species contained a mean mercury concentration of 1.149 mg/Kg and 0.772 mg/Kg respectively. These species are high end predators that are long-lived and voracious eaters. The mercury bioaccumulated in their tissue as methylmercury, the organometallic form, which is the most toxic form. Because there are very few discharges to the reservoir and these are domestic wastewater, the mostly likely mechanism for mercury to enter the reservoir is by atmospheric deposition. Possible sources of mercury in the area of the reservoir include emissions from coal-fired power plants and cement plants. Other sources include naturally occurring sources, volcanic and industrial emissions. There are 13 other waterbodies in Texas that have fish consumption advisories due to mercury. Most are found in East Texas and the Panhandle. These waterbodies have low pH, high dissolved organic material or are shallow wetlands. It is very unusual for Canyon Reservoir to be included on that list. Canyon Lake has hard water and very low dissolved organic content. In 2006, immediately after the fish consumption advisory was issued, GBRA, along with representatives from the COE, toured the lake by boat looking for illicit discharges. The lake level was down due to drought conditions and would have exposed pipelines to the reservoir. None were found. Additionally, GBRA analyzed the wastewater and sludge produced at the CPE facility and no mercury was detected in either matrix.

In addition to the impairment for mercury in fish tissue, Canyon Reservoir, excluding the cove, was listed with a concern for orthophosphorus and nitrate nitrogen. In the three assessment units that make up the main pool of the reservoir, 41 of the 64 analyses exceeded the screening standard for orthophosphate of 0.05 mg/L. Five of the 68 analyses exceeded the screening standard for nitrate nitrogen. Currently, TCEQ is developing standards for nutrients. Nutrient enrichment from nitrogen and phosphorus can cause excessive growth of macrophytes, algal blooms in the open waters as well as attached to the substrate and floating in mats. The Texas Water Quality Standards have narrative but not numerical nutrient criteria. TCEQ staff are developing and evaluating several alternatives for nutrient standards, one of which, is to express the nutrient criteria in terms of chlorophyll a. Canyon Reservoir is listed on the draft Appendix F (Chapter 301.10) that lists site-specific nutrient criteria for reservoirs and lakes in Texas. The table lists the proposed chlorophyll a concentration and screening concentrations for total phosphorus and total nitrogen for each water body. Criteria formulations were based on selected sampling stations that represent the deep pool near the dam for each reservoir, represent average conditions with an allowance for statistical variability, and are calculated as the upper confidence interval of the mean with the assumption that a sample size of 10 is used. Based on these assumptions, the proposed nutrient criteria for Canyon Reservoir include 3.1 microgram per liter (ug/L) chlorophyll a, a screening concentration of 0.054 mg/L total phosphorus and a screening concentration of 0.841 mg/L total nitrogen. Other alternatives that TCEQ staff are considering when developing site-specific nutrient criteria include a use-based approach with uses such as aquatic recreation, fishing and drinking water.

In order to review the historical data and look for trends that would indicate changes in water quality, the data was separated into two areas in the reservoir, the main pool stations and the stations located in coves. The main pool sites and the associated depth profiles were reviewed individually and in comparison with other pool monitoring sites.

Main Pool - Canyon Reservoir

TCEQ has three monitoring sites located in the reservoir, one in the upper portion of the reservoir, located at Cranes Mill Park (site no. 12601), one in the mid-reservoir at Potter's Creek Park (site no. 12600) and one at the dam (site no. 12597). TCEQ Surface Water Quality Monitoring teams collected water quality data from two to four times per year, beginning in 1990 at the Cranes Mill Park and Potter's Creek Park sites and beginning in 2001 at the dam, and the data sets extend to 2007. The US Geologic Survey monitored sites in the mid-1990s, but have not visited their reservoir sites since 1995. The TCEQ data sets were used in the trend analysis because of the availability of the most recent data.

Canyon Reservoir at Crane's Mill Park (site no. 12601-T)

The Crane's Mill Park site is located in the upper assessment unit and in the riverine zone of the reservoir. The average depth at the upstream location at Crane's Mill Park was 8.6 meters, ranging from the time it was most shallow of 4.6 meters in 2006 to the time it was at it's deepest at 15 meters in 1990. The reservoir depth fluctuates the most at this location as the flow from the river upstream varies between wet and dry years. The change in temperature from surface to bottom averaged 1.5 °C, ranging from median temperature at the surface of 27.5°C to and a median temperature at the bottom of 24.3°C. There was no thermal stratification at this location. The conductivity changed an average of 30 micromhos per centimeter (umhos/cm) at the surface to bottom profiles. In normal to wet years the conductivity is lower at the surface than at the bottom. In 2006, which was a very dry year, the conductivity was higher at the surface. The surface conductivities at this site ranged from a median of 382 umhos/cm at the surface to a median conductivity of 397 umhos/cm at the bottom.

The difference in dissolved oxygen between the surface to bottom averaged 1.9 mg/L. The median surface dissolved oxygen at the Crane's Mill Park site was 8.1 mg/L and a median bottom dissolved oxygen of 6.3 mg/L. The oxygen was depleted to less than 1.0 mg/L from surface to bottom four times during the period of record at this site, with the most recent being in August 2005.

The difference in pH from surface to bottom at this reservoir location averaged a change of 0.23 pH units. No surface or profile sample fell outside the pH standard range of 6.5 to 9.0.

Nutrients, dissolved constituents, suspended solids and chlorophyll a were analyzed in the surface samples only. Nitrate nitrogen was reported using three

different methods over the period of data collection. Combining the three methods, nitrate nitrogen had a median concentration of 0.05 mg/L, ranging from less than method detection to 0.88. The concentrations measured at the site exceeded the reservoir screening concentration of 0.37 mg/L 8 times or 20% of the time. Ammonia nitrogen had a median concentration of 0.05 mg/L, ranging from less than method detection to 0.23 mg/L, exceeding the reservoir screening concentration of 0.11 mg/L two times. The total phosphorus concentrations ranged from less than method detection to 0.08 mg/L, with a median concentration of less than method detection. Orthophosphate was measured at this site and on the 2008 draft Texas Water Quality Inventory it was noted that there was a concern for this nutrient. One important note to make is that of the 31 measurements of orthophosphate, the method detection level of 0.06 mg/L that was used the majority of the time, was greater than the screening concentration of 0.05 mg/L. It appears that the assessment was done by dropping the less than symbol for the calculations, an accepted practice for data sets containing non-detects, and using that concentration which would make the site appear to exceed the screening concentration.

Chloride and sulfate had median concentrations of 15 and 20 mg/L, respectively and ranged from 9 to 19 mg/L chloride and 12 to 24 mg/L sulfate, both well below the stream standard of 50 mg/L for each. The total suspended solids had a median concentration of 6 mg/L, ranging from 3 mg/L to 123 mg/L, the highest recorded concentrations occurring with high inflows into the reservoir. The high solids content is typical of the riverine zone of the reservoir. The chlorophyll a concentrations were less than 10 ug/L, the method detection limit used by the TCEQ laboratory, and well below the screening concentration of 26.7 ug/L for the assessment unit.

TCEQ also collected metals in water and metals in sediment at this reservoir location. The metals in water had only one to two data points in the data set. However, the analysis of metals in sediment had a data set that included 10 data points. Table 1 gives the median concentrations in milligrams per kilogram or parts per billion of each metal analyzed. The analysis for metals in sediment is important in a reservoir, and especially in those like Canyon Reservoir, because metals will be released from the sediment when the hypolimnion becomes anoxic. The metal oxides that are bound in the sediment then become a source of oxygen for bacteria. The metal ions released diffuse into the water column and can be dispersed throughout the volume of the reservoir as the lake turns over in the fall. As the metals enter the water column, the ions can combine with the available oxygen and become oxides again, be diluted by the large volume in the reservoir, and/or possibly bioaccumulate in the food chain. This source of heavy metals could be an explanation for the mercury in fish tissue impairment in Canyon Reservoir.

Table 1. Metals in Sediment at Canyon Reservoir Sites (1998-2006). Median concentrations in milligrams per kilogram.

Site	Aluminum	Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Manganese	Mercury	Sellinium	Silver	Zinc
Crane's Mill Park	25900	5.9	67.6	0.31	16.5	8.4	10.6	295	0.0475	0.474	ND[1]	33.2
Potter's Creek Park[2]	30300	12.1	93.9	ND	21.7	9.1	12.4	351	---[3]	0.63	ND	34.3
At the Dam[2]	31700	<11.9	106	ND	22.1	10.1	15.1	334	---[3]	0.77	ND	35.4

[1] ND = none detected

[2] Only one sample in data set.

[3] Mercury in sediment was not analyzed at this site.

Canyon Reservoir at Potter's Creek Park (site no. 12600-T)

Moving into the transition zone of the reservoir, the TCEQ samples a site at Potter's Creek Park that has an average depth of 15.2 meters, varying from a shallow depth of 6 meters to a maximum depth of 28 meters. The site weakly stratified in the summer months and was uniform in dissolved oxygen (DO) and temperature in the fall and winter samples. The change in dissolved oxygen in the fall and winter months averaged 1.98 mg/L, with the largest difference of 4.0 mg/L seen in November 2006. In comparison, the spring and summer months averaged 7.1 mg/L change from surface to bottom profiles. Thirteen of the 33 sampling events recorded less than 1.0 mg/L DO at the bottom, more often than the other two reservoir locations. This supports the past studies that show that it is near this site in the reservoir that the solids carried from the river begin to settle out and the oxygen is depleted as the bacteria decompose the organic solids.

As was the case at the Crane's Mill site, the Potter's Creek site profiles had lower conductivities at the surface than at the bottom. In all of the 34 profiles taking at the Potter's Creek site, only three were the inverse. The average difference between the surface and bottom profile samples was 50 umhos/cm. The pH change averaged 0.5 pH units from surface to bottom and no individual sample in the profiles exceeded the 6.0 to 9.5 pH standard.

Nutrients, dissolved constituents, suspended solids and chlorophyll a were analyzed in the surface samples only. Nitrate nitrogen was reported using three different methods over the period of data collection. Combining the three methods, nitrate nitrogen had a median concentration of 0.06 mg/L, ranging from less than method detection to 0.63. The concentrations measured at the site exceeded the reservoir screening concentration of 0.37 mg/L 4 times or less than 10% of the time. Ammonia nitrogen had a median concentration of less than detection, ranging from less than method detection to 0.55 mg/L, exceeding the reservoir screening concentration of 0.11 mg/L two times. The total phosphorus concentration ranged from less than method detection to 0.06 mg/L, with a median concentration of less than method detection. Orthophosphate was measured at this site and, as was mentioned concerning the Crane's Mill site, it was noted on the 2008 Texas Water Quality Inventory that there was a concern for this nutrient. The same observation applies to this site that, of the 35 analyses done for orthophosphate, the method detection level of 0.06 mg/L that was used the majority of the time was greater than the screening concentration of 0.05 mg/L.

Chloride and sulfate had median concentrations of 15 and 20 mg/L, respectively and ranged from 9 to 18 mg/L chloride and 12 to 24 mg/L sulfate, both well below the stream standard of 50 mg/L for each. The total suspended solids had a median concentration of 4 mg/L, ranging from 1 mg/L to 24 mg/L. The high concentrations associated with high inflows into the reservoir seen in the riverine zone on the reservoir are not seen at the Potter's Creek site, located in the transition zone. The chlorophyll a concentrations were less than 10 ug/L, the method detection limit used by the TCEQ laboratory, and well below the screening concentration of 26.7 ug/L for the assessment unit.

TCEQ also collected metals in water and metals in sediment at this reservoir location, but only had one to two data points in the data set. Table 1 gives the measured concentration in milligrams per kilogram or parts per billion of each metal to be used as comparison to the Crane's Mill Park site only and not for assessment.

Canyon Reservoir at the Dam (site no. 12597-T)

The TCEQ has been monitoring the location at the dam, in the lacustrine zone, since the summer of 2001. The average depth at the dam was 27.4 meters, ranging from its most shallow of 21.3 meters in 2006 to 32 meters. The reservoir depth fluctuates as the volume varies between wet and dry years. The change in temperature from surface to bottom averaged 7.7 °C, ranging from median temperature at the surface of 23.4°C to and a median temperature at the bottom of 15.2°C. Thermal stratification occurred in the summer months in most years. As seen at the upper stations, the conductivity gained an average of 41 micromhos per centimeter (umhos/cm) from surface to bottom profiles. The surface conductivities at this site ranged from a median of 374 umhos/cm at the surface to a median conductivity of 418 umhos/cm at the bottom.

The difference in dissolved oxygen between the surface to bottom averaged 4.9 mg/L. The median surface dissolved oxygen at the dam was 8.7 mg/L and a median bottom dissolved oxygen of 2.4 mg/L. The oxygen was depleted to less than 1.0 mg/L from surface to bottom six times during the period of record at this site (out of 23 sampling events), with the most recent being in July 2007.

The difference in pH from surface to bottom at both reservoir locations averaged a change of 0.52 pH units. The median surface pH was 8.2 and the median pH at the bottom was 7.5. No surface or profile sample fell outside the pH standard range of 6.5 to 9.0.

Nutrients, dissolved constituents, suspended solids and chlorophyll a, were analyzed in the surface samples only. Nitrate nitrogen was reported using two different methods over the period of data collection. Combining the two methods, nitrate nitrogen had a median concentration of 0.085 mg/L, ranging from less than method detection to 0.47. The concentrations measured at the site exceeded the reservoir screening concentration of 0.37 mg/L 2 times. Ammonia nitrogen had a median concentration of less than method detection, never exceeding the reservoir screening concentration of 0.11. The median concentration for total phosphorus was less than method detection. Orthophosphate was measured at this site and on the 2008 Texas Water Quality Inventory it was noted that there was a concern for this nutrient. Again, as at the other two main pool sites, of the 18 measurements made for orthophosphate the method detection level of 0.06 mg/L that was used the majority of the time was greater than the screening concentration of 0.05 mg/L and at this site the reported values were less than 0.06 mg/l 100% of the time. It appears that the assessment was done by dropping the less than symbol and using that concentration in the calculations, which would make the site appear to exceed the screening concentration.

Chloride and sulfate had median concentrations of 15 and 20.5 mg/L, respectively and ranged from 12 to 18 mg/L chloride and 16 to 23 mg/L sulfate, both well below the stream standard of 50 mg/L for each. The total suspended solids had a median concentration of 3 mg/L, ranging from less than method detection to 8 mg/L. The chlorophyll a concentrations were less than 10 ug/L, the method detection limit used by the TCEQ laboratory, and well below the screening concentration of 26.7 ug/L for the assessment unit.

TCEQ also collected metals in water and metals in sediment at their reservoir locations, but only had only one to two data points in the data set for the location at the dam. Table 1 gives the measured concentration in milligrams per kilogram or parts per billion of each metal to be used as comparison to the Crane's Mill Park site only and not for assessment.

The historical data for the main pool of the reservoir was reviewed for trends over time and none were found, or if found, were not indicative of a degradation in water quality.

Cove Sites – Canyon Reservoir

GBRA has two monitoring locations in coves on Canyon Reservoir. The first site located near the Canyon Lake Marina (site no. 12598) was established in 1987 as part of the GBRA historical monitoring program aimed at looking at water quality for contact recreation. The parameter list was expanded in 1996 when GBRA joined the Clean Rivers Program. The TCEQ has also monitored at this location and their data is part of this review. GBRA monitors this site monthly and samples are collected from the first third of a meter.

The second monitoring site (GBRA) was established in 2001 at the request of the Comal County Judge. He and the Commissioner's Court were concerned about the wastewater discharge to the cove and wanted a monitoring site closer to the discharge. The site near the Jacob's Creek Park (site no. 17443) is approximately two miles from the discharge. The site is monitored quarterly.

Both coves are relatively shallow as compared to the main pool of the reservoir. The sample sites are located in the assessment unit that refers to the coves around Jacob's Creek Park. There were no concerns noted for this assessment unit other than the mercury in fish tissue impairment previously mentioned.

Looking at the water quality at the Jacob's Creek Park site, the median temperature is 20 °C, ranging from 13.2 to 30.7 °C. The median **specific conductance** was 400 umhos/cm, ranging from 328 to 461 umhos/cm. The dissolved oxygen ranged from 6.79 to 12.5 mg/l, with a median concentration of 10 mg/L and never exceeded the screening concentration of 6.0 mg/L. The pH of the water at the Jacob's Creek Park site ranged from 7.85 to 8.36 pH units, with a median pH of 8.2.

Nitrates, ammonia and total phosphorus were analyzed at the Jacob's Creek Park site. The nitrates were reported using three storet codes, nitrate alone and in combination with nitrite nitrogen. Looking at all three methods, the median

concentration for nitrates was 0.06 mg/L, ranging from less than detection to 0.38 mg/L, exceeding the screening concentration for this assessment unit one time. The ammonia nitrogen was always measured below the screening concentration and the median concentration was below the method detection level. Total phosphorus had a median concentration of less than method detection and did not exceed the screening concentration.

Chlorophyll a concentrations were very low and never approached the screening concentration of 26.7 micrograms per liter (ug/L). The median concentration was 1.5 ug/L, and the highest concentration measured in the historical data set was 10.8 ug/L. ***E.coli*** concentrations are also very low, with the highest concentration measured being 61 organisms per 100 milliliters. The geometric mean for the site was 3 organisms per 100 milliliters.

The historical data was reviewed for trends over time and none were found, or if found, were not indicative of a degradation in water quality at this location.

The GBRA site in the cove near the Canyon Lake Marina has an extensive historical data set. The median temperature is 24.3 °C, ranging from 10.5 to 32 °C. The median **specific conductance** was 386 umhos/cm, ranging from 306 to 526 umhos/cm. The dissolved oxygen ranged from 6.06 to 12.8 mg/l, with a median concentration of 8.8 mg/L and never exceeded the screening concentration of 6.0 mg/L. The pH of the water at the Jacob's Creek Park site ranged from 7.1 to 8.9 pH units, with a median pH of 8.15.

Nitrates, ammonia and total phosphorus were analyzed at the GBRA marina site. The nitrates were reported using three storet codes, nitrate alone and in combination with nitrite nitrogen. Looking at all three methods, the median concentration for nitrates was 0.12 mg/L, ranging from less than detection to 1.5 mg/L, exceeding the screening concentration of 0.37 mg/L for this assessment unit 26 out of 233 measurements (11.1%). The median concentration for ammonia nitrogen was below the method detection level. Figure 1 shows the concentration of ammonia nitrogen over time. We see a significant drop in concentration in 2001. As mentioned in previous basin highlights and summary reports, the elimination of the distillation step from the analytical procedure for ammonia nitrogen removed the contamination of the samples by the laboratory atmosphere and reduced the measured ammonia nitrogen in the samples. After the analytical method was changed, the concentration of ammonia nitrogen at this site does not exceed the screening concentration of 0.11 mg/L, and the median concentration for ammonia nitrogen dropped to 0.02 mg/L.

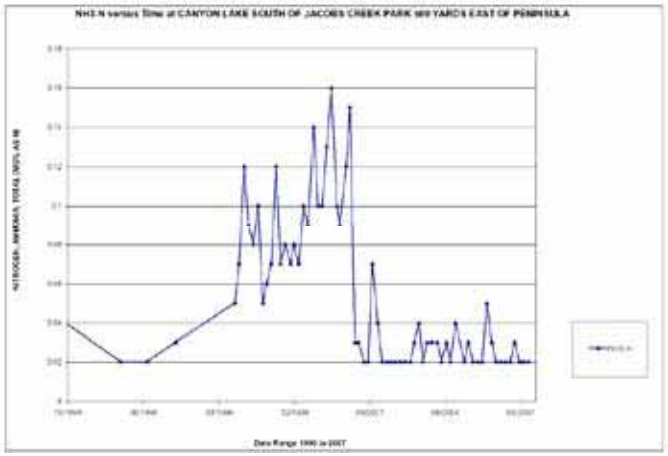

Figure 1. Ammonia nitrogen concentrations over time, near the Canyon Lake marina (12598). Drop in concentration in 2001 attributed to the removal of the distillation step from the analytical procedure.

Chlorophyll a concentrations were very low and exceeded the screening concentration of 26.7 micrograms per liter (ug/L) one time. The median concentration was 2.0 ug/L. The highest concentration measured in the historical data set was 37.3 ug/L which occurred when the reservoir was in the flood pool at 948 msl due to the historic flood of 2002. The reservoir is usually held at 909 msl or less so there was almost 40 feet of inundated land which most likely contributed nutrients and promoted an uncharacteristic spike in algal production (figure 2).

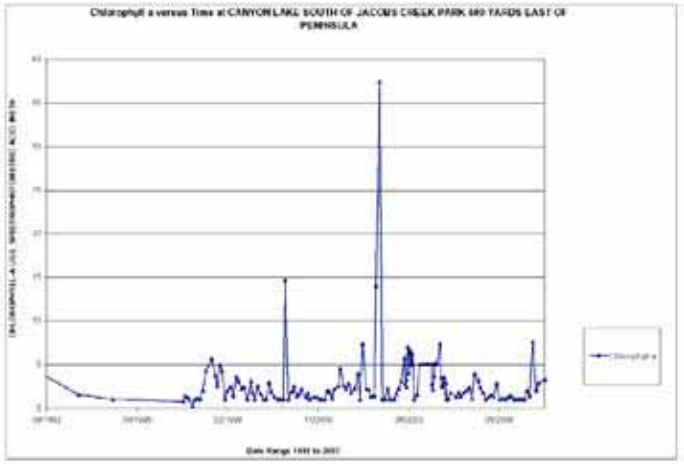

Figure 2. Chlorophyll a over time at the GBRA Canyon Lake Marina site (12598). Spike in chlorophyll a in 2002 due to nutrients from inundated areas that promoted the growth of algae.

The geometric mean for ***E. coli*** at the GBRA Canyon Lake Marina site was 4 organisms per 100 milliliters, ranging from less than detection to 460 organisms per 100 milliliters. There was only one exceedence of the stream standard for contact recreation of 394 organisms per 100 milliliters which occurred in February 2006. There was no rainfall recorded in close proximity to the sampling location so the spike in *E. coli* was not due to runoff.

The historical data was reviewed for trends over time and none were found, or if found, were not indicative of a degradation in water quality at this location.